

What is claimed is:

1. A coupon used for measuring corrosion rates of material exposed to hostile environment comprising:

a substrate,

5 a first thin film resistive element carried on such substrate and exposed to the hostile environment, and

a second thin film resistive element carried by said substrate and shielded from the hostile environment, said first and second thin film resistive elements positioned so that they are subjected to essentially the same temperature.

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2. A coupon as in claim 1 in which said thin metal elements are composed of a material which has substantially the same resistance before being subjected to a corrosive environment.

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3. A coupon as in claims 1 or 2 in which the substrate is an insulator.

4. A coupon in as in claim 1 in which the substrate is a ceramic.

5. A coupon as in claim 4 in which the ceramic is beryllium oxide.

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6. A coupon as in claim 1 in which the substrate is a metal with a insulating surface oxide film.

7. A coupon as in claim 6 in which the substrate is FeCrAlY.

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8. A coupon as in claims 1 or 2 in which said first and second resistive elements are on the same side of the substrate.

9. A coupon as in claim 2 in which said material forming the thin films is  
30 a metal or metal alloy.

10. A coupon as in claims 1 or 2 in which said first and second resistive elements are on opposite sides of the substrate and the substrate is thermally thin.

11. A system for measuring the corrosion rate of metals in a hostile environment comprising a coupon including:

a substrate,

a corrosive thin film metal resistive element carried on said substrate for  
5 exposure to the hostile environment, and

a second reference thin film metal resistive element carried on substrate shielded from the hostile environment, said first and second thin film elements positioned on said substrate to be subjected to essentially the same temperature, means for driving a current  $I$  through said first and second thin film metal

10 elements,

means for measuring the voltage  $V_C$  generated across said corrosive thin film metal elements and the voltage  $V_R$  generated across said reference thin film element by the current flowing therethrough, and

means for processing said current and voltages to provide a measure of change  
15 in resistance of the corrosive thin film metal element.

12. A system as in claim 11 including means for continuously receiving resistance difference to indicate the progression of corrosion.

20 13. A system as in claim 11 in which said thin film metal elements are deposited so as to have essentially the same resistance before corrosion of the corrosive element.

14. A coupon for use in measuring the corrosion rate of metals exposed to a  
25 high-temperature hostile environment comprising:

a substrate,

a first thin narrow elongated strip of metal or metal alloy adapted to be exposed to the hostile environment carried by said substrate,

a second thin narrow elongated strip of the same metal or metal alloy as the  
30 first carried by the substrate and shielded from the hostile environment but exposed to the substantially the same high temperature as the first elongated strip of metal or metal alloy.

15. A coupon as in claim 14 in which the substrate is thin and the first and second elongated strips are on opposite faces of the substrate whereby the second elongated strip is shielded from the hostile environment by the substrate.

5 16. A coupon as in claim 15 wherein the second elongated strip is further shielded by an oxide film on its exposed surface.

17. A coupon as in claim 14 in which said first and second elongated strips are on the same face of the substrate and the exposed face of the second strip is  
10 shielded from the hostile environment by an oxide film.

18. A coupon as in claim 17 in which the first and second elongated strips extend adjacent to one another in close proximity.

15 19. A coupon as in claim 17 in which said first elongated strip overlies the second strip and is insulated therefrom by an oxide film.

20. A coupon as in any of claims 14, 15, 16, 17, 18 or 19 in which the substrate is a ceramic.

20 21. A coupon as in any of claims 14, 15, 16, 17, 18 or 19 in which said substrate is a metal with an oxide insulating and protective film.

22. A coupon as in claim 15 including a third elongated strip adapted to be  
25 exposed to the hostile environment adjacent the other side of the first elongated strip and exposed to substantially the same temperature.

23. A coupon as in claim 18 or 19 in which the elongates strips spiral.

30 24. A coupon as in claim 18 or 19 in which the strips zig-zag.